

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

CIF LICENSING, LLC, d/b/a)	
GE LICENSING)	
)	
Plaintiff,)	
)	
v.)	C.A. No. 07-170 (JJF)
)	
AGERE SYSTEMS INC.,)	
)	
Defendant.)	

**PLAINTIFF CIF LICENSING, LLC, d/b/a GE LICENSING'S
OPENING CLAIM CONSTRUCTION BRIEF**

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I. INTRODUCTION

Pursuant to the Court's September 19, 2007 Scheduling Order (D.I. 32), Plaintiff CIF Licensing, LLC ("GE Licensing") submits this *Markman* brief¹ in support of its proposed construction of fifteen (15) terms² from the asserted claims of U.S. Patent Nos. 5,048,054 ("054 patent"), 5,428,641 ("641 patent"), 5,446,758 ("758 patent"), and 6,198,776 ("776 patent") (collectively, the "Asserted Patents"). Copies of the Asserted Patents are attached as Exhibits A-D to the Appendix of Exhibits filed contemporaneously herewith. The Joint Claim Construction statement of GE Licensing and Agere Systems Inc. ("Agere") is being filed separately.

There are five main construction disputes between the parties. First, many of the terms at issue are either well-known to any reader of English (e.g., "can be") or well known to those of ordinary skill in the art (e.g., "receiver"), and are used in the patents consistently with those known meanings. For those terms, the plain and ordinary meaning of the language should control instead of the blatantly incorrect constructions proposed by Agere (e.g., "can be" means "must be").³ Second, by creating from whole cloth limitations such as "hardware device"⁴ and specific component exclusions⁵, Agere is attempting to read out technology (general microprocessors and digital signal processors) commonly used in modems. Third, Agere repeatedly violates a basic tenet of claim construction by importing limitations from the

¹ In *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (*en banc*), *aff'd*, 517 U.S. 370 (1996), the Federal Circuit held that claim construction was the exclusive province of the Court.

² All these terms were initially proposed by Agere for construction. In addition, the parties have proposed agreed constructions for four terms.

³ See Sections VI(A)(2)(a), (b) and (d); VI(B)(2)(a) and (c); and VI(C)(2)(a) below.

⁴ See Sections VI(A)(2)(a), (b) and (d); VI(B)(2)(d)-(g) below.

⁵ See Sections VI(B)(2)(d)-(f) below.

specification into its constructions in an attempt to limit claims to one preferred embodiment.⁶

Fourth, Agere improperly seeks to treat a number of cherry-picked preambles as limiting.⁷

Fifth, Agere, persistently employs confusing verbosity by wrongly incorporating other claim language from the same claim into its proposed construction of a specific claim term at issue.⁸

II. NATURE AND STAGE OF THE PROCEEDING

GE Licensing commenced this action on March 23, 2007, accusing Agere of infringing the Asserted Patents by making, using, offering for sale, and selling certain modems, commonly called dial-up or analog modems. (D.I. 1.)

III. SUMMARY OF ARGUMENT

The proposed constructions of GE Licensing should be adopted and Agere's should be rejected. The preambles at issue are not limiting since a preamble is not a limitation if the body of the claim describes a "structurally complete invention" or if the preamble merely states the intended use of the invention. *Symantec Corp. v. Computer Assocs. Int'l, Inc.*, No. 2007-1201, -1239, 2008 U.S. App. LEXIS 7826, at *11 (Fed. Cir. Apr. 11, 2008); *Catalina Mktg., Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808-09 (Fed. Cir. 2002). And if they are construed as limiting, the constructions proposed by Agere are unduly restrictive.

Where GE Licensing proposes plain meaning, those proposals should be adopted over Agere's attempts to read limitations into the claims from the specification. "Claims should be read broadly, and additional limitations should not be imported from the specification, and certainly not from [the] description of the preferred embodiment." *Kwitek v. Pilot Corp.*, 516 F. Supp. 2d 709, 719 (E.D. Tex. 2007). In offering its unduly restrictive claim constructions, Agere

⁶ See Sections VI(A)(2)(a), (b) and (d) below.

⁷ See Sections VI(A)(1), VI(B)(2)(b)-(c); VI(C)(2)(c) below.

⁸ See Sections VI(A)(2)(a), (b) and (d).

has clearly crossed the line between “using the specification to interpret the meaning of a claim and importing limitations from the specification into the claim.” *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (*en banc*), *cert. denied*, 546 U.S. 1170 (2006).

So, too, this Court should reject Agere’s attempt to read “hardware” limitations into the claims. That is not justified by either the specifications or the prosecution histories. Furthermore, Agere’s attempt to take software or firmware implementations out of the ambit of the claims is inconsistent with the knowledge and understanding of ordinarily skilled artisans.

IV. STATEMENT OF FACTS

A. Overview of Modem Technology⁹

1. Modems

Modems facilitate telecommunications between devices such as computers or fax machines. They are implemented in hardware, software, firmware, and their combinations.. Since the late 1980s, modems have typically employed a combination of analog and digital electronics. A modem’s functions are commonly controlled through software/firmware running on a dedicated, shared or general use microprocessor or digital signal processor (DSP). Most (if not all) of today’s modems compliant with V.34, V.90 and V.92 standards employ a combination of hardware controlled by software/firmware. Certain modems are frequently referred to as software modems (or “softmodems”), others as “DSP modems” and still others as hardware modems. A “hardware modem” includes an embedded DSP and a hardware controller. A “DSP modem” includes an embedded DSP but no hardware controller. A “softmodem” is a software program running on the CPU of the host computer that performs most modem functions.

⁹ The technology at issue in the Asserted Patents is admittedly complex. At the Court’s request, GE Licensing (joined by Agere) is prepared to present a tutorial delivered by counsel and/or the parties’ respective experts. Highlights of the patented technology are, however, addressed below.

2. How Modems Communicate

To facilitate communications with various equipment, most modem manufacturers (including Agere) manufacture their modems to be compliant with a number of standards issued by the International Telecommunication Union Telecommunication Standardization Sector (commonly known as the “ITU-T”). The Asserted Patents stem from work performed to address specific problems.¹⁰

The inventions claimed in the Asserted Patents have been adopted, after extensive peer review and competition, into certain of those ITU-T standards (V.34, V.90 and V.92).¹¹ The claimed inventions of the '054, '641 and '758 patents were incorporated into ITU-T Recommendation V.34 (Telecommunications Standardization Sector of ITU, *A Modem Operating At Data Signalling Rates Of Up To 28 800 bit/s For Use On The General Switched Telephone Network And On Leased Point-To-Point 2-Wire Telephone-Type Circuits: ITU-T Recommendation V.34* (issued in 1994) (hereinafter “ITU-T Recommendation V.34”)) (attached as Exhibit F), and the claimed inventions of the '776 patent were incorporated into ITU-T Recommendation V.92 (Telecommunications Standardization Sector of ITU, *Enhancements to*

¹⁰ The Asserted Patents originated at a subsidiary of Motorola Inc. called Codex Corp. and were assigned in 2004 from Motorola to GE Licensing. Codex/Motorola has granted licenses to utilize the Asserted Patents to the world’s largest modem manufacturers. Agere (and its predecessors Lucent Technologies Inc. and AT&T Corp.) has been aware of the Asserted Patents since at least 2003, but has refused to acknowledge the value of the Asserted Patents, resulting in the present lawsuit.

¹¹ The inventors of the Asserted Patents represent some of the most recognized individuals in the modem field, who worked individually and as part of a team that revolutionized communications technology. This period has been described by Agere’s expert, Dr. Steven Tretter, as “a very exciting time. New techniques were being proposed and discovered continually during the deliberations.” Steven A. Tretter, *Constellation Shaping, Nonlinear Precoding, and Trellis Coding for Voiceband Telephone Channel Modems* xi (Kluwer Acad. Pub. 2002) (hereinafter “Tretter, *Constellation Shaping*”) (Exhibit E). Dr. Tretter went on to note that technology advances in digital signal processors “allowed the committee to consider techniques that were significantly more complex and effective than anything implemented before.” *Id.* at xi-xii.

Recommendation V.90: ITU-T Recommendation V.92 (issued in 2000) (hereinafter “ITU-T Recommendation V.92”)) (attached as Exhibit G).¹²

Modems facilitate communications via a network, generally the telephone network (also called the public switched telephone network, or “PSTN”). They transmit and receive information which may be expressed in a binary form (*i.e.*, ones and zeros), each a “bit” of data. ‘641 Patent, Exh. B, col. 1:13-15. One important characterizing parameter is a modem’s “bit rate” (sometimes called “data rate”—how much information (or how many bits) it can transmit per second (often expressed in bits per second or “bps”).

Over the last forty years, bit rates of modems¹³ have increased dramatically, from 300 to 600 bps in the 1960s to more than 50,000 bps today. In the 1970s and early 80s, bit rates increased to 1200, 2400, 4800, 7200, and 9600 bps—which was the maximum data rate allowed under the V.32 standard issued in 1984. An improved standard, V.32bis, issued in early 1991, allowed further enhanced rates of 12,000 and 14,400 bps.

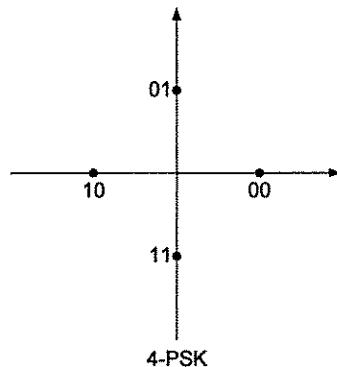
Rather than transmit information as bits, modems may transmit information in the form of “symbols” (or “bauds”), each of which represents a number of bits. Prior to the 1990s, the highest symbol rate (also called “baud rate”) was 2400 symbols per second. The corresponding

¹² The inventor and co-inventor of the ’054, ’758 and ’776 patents, Dr. M. Vedat Eyuboğlu, co-authored the definitive paper on the V.34 standard. See G. David Forney, Jr., Les Brown, M. Vedat Eyuboğlu, John L. MorannIII, Motorola, Inc., *The V.34 high speed modem standard*, 34 IEEE Comm. Mag., 28 (Dec. 1996) (hereinafter “Forney et al., V.34”) (Exhibit H). Dr. Eyuboğlu and the Codex/Motorola team are also recognized throughout Dr. Tretter’s book for their contributions to the V.34 standard. See, *e.g.*, Tretter, *Constellation Shaping* at xii, 256 (Exhibit E). In addition, Dr. Eyuboğlu and the other co-inventors of the ’776 patent, Drs. Pierre Humblet and Dae-Young Kim, were co-authors on the definitive paper on the V.92 standard. See Dae-Young Kim, Pierre A. Humblet, M. Vedat Eyuboğlu, Les Brown, G. David Forney, Jr., Sepehr Mehrabanzad, S., *V.92: the last dial-up modem?*, 52 IEEE Transactions on Comm., 54-61 (Jan. 2004) (hereinafter “Kim et al., V.92”) (Exhibit I).

¹³ The class of modems at issue in this case are commonly called “analog modems.” However, the asserted patents cover modem technologies beyond analog modems.

bit rates varied based on how many bits each symbol transmitted at that symbol rate. For example, in respectively transmitting 4800, 7200, 9600, 12,000, and 14,400 bps, the modems can transmit 2400 symbols per second, each symbol respectively having 2, 3, 4, 5, or 6 bits.

One way to deal with transmitted symbols is to label them as points in a mathematical space, called “constellation points”, that represent the symbols. *See Declaration of Dr. Harry V. Bims in Support of Plaintiff CIF Licensing, LLC, d/b/a GE Licensing’s Opening Claim Construction Brief* (hereinafter “Bims Decl.”), at ¶ 45. In a simple example, a modem transmits 2 bits per symbol. Since each bit can be a 0 or a 1, these two bits of information can represent one of four combinations—00, 01, 10, 11. The symbol is said to have four signal states, which can be represented by a constellation of four points, as shown in this drawing:

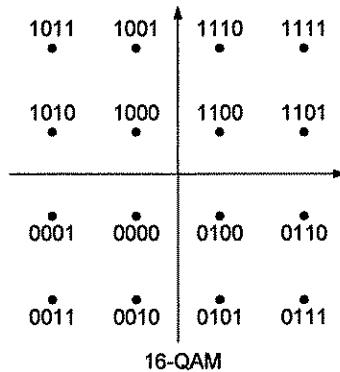


The locations of the four points have significance. In this example, each constellation point represents the phase shift of a sine wave, where the points labeled 00, 01, 10, and 11 correspond to phase shifts of 0°, 90°, 180°, and 270°, respectively. The 2-bit data therefore maps to a phase shift amount. This is called “constellation mapping.”¹⁴

¹⁴ As an analogy, consider a customer ordering fast food at a restaurant. The menu presented to the customer is a constellation of option combinations. Each item on the menu is assigned a number, which is used by the customer as shorthand for the menu item when ordering. A menu item number is a signal point within the constellation, and the food itself is a pattern (e.g., combination of sine and cosine waves) associated with a signal point menu item number.

(continued...)

During transmission, what is transmitted is not the 2-bit data itself, but rather a sine wave whose phase is shifted in correspondence with the 2-bit data.¹⁵ Extending the example, transmission of 4 bits per symbol allows 16 different bit combinations ($2^4 = 16$) or signal states, which can be represented as a 16-point constellation as shown here:



Using this constellation, a symbol may be transmitted using a sine wave and a cosine (which are 90° phase-shifted from each other), each having one of eight different amplitudes.¹⁶

Likewise, a symbol representing 5 bits would have a 32-point ($2^5 = 32$) constellation, and a symbol representing 6 bits would have a 64-point ($2^6 = 64$) constellation.¹⁷ Although increasing the number of bits per symbol appears to be an easy way to increase bit rate, the greater the number of signal states (or constellation points), the closer together the constellation

Mapping is the process that a customer goes through to correlate their hunger for a certain food into a menu item number that is ordered.

¹⁵ This specific transmission method is called “phase-shift keying” or “PSK,” and a 4-point constellation using PSK is called “4-PSK.”

¹⁶ This transmission method is called “quadrature amplitude modulation” or “QAM,” and a 16-point constellation using QAM is called “16-QAM.” This constellation was used in the V.32 Recommendation, in which it was called a “signal structure.” See Telecommunications Standardization Sector of ITU, *A Family Of 2-Wire, Duplex Modems Operating At Data Signalling Rates Of Up To 9600 bit/s For Use On The General Switched Telephone Network And On Leased Telephone-Type Circuits: ITU-T Recommendation V.323*, Fig. 1/V.32 (issued in 1993) (hereinafter “ITU-T Recommendation V.32”) (Exhibit J).

¹⁷ Powers of 2 (e.g., 16, 32, 64, etc.) are used in these simple examples, but there is no requirement that the number of constellation points be a power of 2. See Bims Decl. ¶ 46; '641 patent, col. 3:60-63

points will be. But constellation points can be more reliably decoded at the receiver if they are farther apart. That is because in a real transmission system, the receiving modem must determine the transmitted signal notwithstanding the effects of noise and distortion, so the farther apart two points are, the easier it is to distinguish them.¹⁸ As a result, the tradeoff in increasing the number of bits per symbol is a decrease in the distance between constellation points, and greater susceptibility to noise and errors.

Another consideration in modem design is transmission power. The farther away a constellation point is from the origin of a constellation, the more power is required to transmit that point. Also, increasing power at each point separates the constellation points from each other, reducing error potential. However, power can not be increased without limit. For example, transmission power can be limited by regulations or by design constraints (such as not wanting to use power reserves for modem transmission in connection with a laptop computer running on battery power).

Systems and algorithms have been developed with the goal of transmitting data at a high bit rate with minimal errors using minimal power. Some correct for errors by adding “overhead” bits for redundancy or using a parity bit; others change the size and/or shape of the constellations, or use different coding schemes.¹⁹

¹⁸ In the 4-PSK (2-bit) system shown above, noise may shift the phase of the transmitted signal by, for example, greater than 45°, thus making a 0° transmitted point (“00”) appear to the receiving modem as the 90° transmitted point (“01”).

¹⁹ Adding bits for redundancy or error correction may result in a non-integral (or fractional) number of bits (on average) transmitted per symbol. Hence, there can be a difference between the terms “bit rate” or “data rate” on the one hand and “net bit rate” or “data transfer rate” on the other, the former denoting absolute number of bits transmitted, while the latter denotes the number of information bits transmitted. For example, in a system that transmits 1 parity bit for every 7 information bits, the “data transfer rate” would be 7/8 that of the “bit rate.”

The Asserted Patents approach the matter differently. The '054 Patent is directed to "line probing," which measures how much noise is on the line between the transmitting and receiving modem (such line is often called a "channel") at different choices of symbol rate and transmission frequency, and determines a combination of symbol rate and transmission frequency that minimizes the impact of the noise in the channel, allowing for higher data rates. The '641 Patent is directed to "zero padding," which facilitates the transmission of fractional bits per frame, while at the same time minimizing overhead and transmission power. The '758 and '776 patents are directed to different ways of "precoding," which compensates for distortions created by the channel between the transmitting and receiving modems and maximizes the likelihood of correct decoding at the receiving end.

The precoding in the '758 patent uses a feedback loop that flexibly supports substantially any data rate, using substantially any signal constellation, while achieving a result that is as close to ideal as possible. This is performed while separating constellation shaping from the precoding function. Precoding in the '776 patent maximizes the likelihood of correctly recovering the original data at the receiver end by optimizing, at the transmitter end, the constellation design with respect to various criteria, including compensating for the impact of noise encountered due to conversion of analog phone signals to digital data in the telephone company's central office, as well as noise from other sources.

V. CLAIM CONSTRUCTION PRINCIPLES

A. Claim Construction Generally

Claim construction is the process by which the objective meaning of claim language is obtained. *See Markman*, 52 F.3d at 986. Proper analysis of a claim begins with intrinsic evidence. "It is well-settled that, in interpreting an asserted claim, the court should look first to the intrinsic evidence of record, *i.e.*, the patent itself, including the claims, the specification and,

if in evidence, the prosecution history.” *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996).

It is “the words of the claim themselves” that define the scope of the patented inventions and the right to exclude. *Id.* The written description “does not delimit the right to exclude. That is the function and purpose of the claims.” *Phillips*, 415 F.3d at 1312 (quoting *Markman*, 52 F.3d at 980). Each word of a claim must be given significance. *See Unique Concepts, Inc. v. Brown*, 939 F.2d 1558, 1562 (Fed. Cir. 1991).

Claim terms “are generally given their ordinary and customary meaning.” *Phillips*, 415 F.3d at 1312-13 (quoting *Vitronics*, 90 F.3d at 1582). Because patents are addressed to and intended to be read by persons skilled in the pertinent art, the ordinary and customary meaning is the meaning the term would have to a person of ordinary skill in the art in question as of the effective filing date of the invention. *Id.* (citing *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1116 (Fed. Cir. 2004)); *see also, Renishaw PLC v. Marposs Società per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998).

Disputed claim terms are to be read in the context of the entire patent, including the specification and, if it is in evidence, the prosecution history; *i.e.*, the intrinsic claim construction evidence. *Phillips*, 415 F.3d at 1313 (citing *Multiform Desiccants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1477 (Fed. Cir. 1998)).

The context of an entire claim may provide guidance as to the meaning of particular terms as may other claims in the same patent, asserted or unasserted. *Phillips*, 415 F.3d at 1314 (citing *Vitronics*, 90 F.3d at 1582). Differences among claims may be useful in understanding particular terms. *Id.* (citing *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 (Fed. Cir. 1991)). “[T]he presence of a dependent claim that adds a particular limitation gives rise to a

presumption that the limitation in question is not present in the independent claim.” *Id.* at 1315 (citing *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Cir. 2004)).

The specification plays a special role and “is always highly relevant to the claim construction analysis. Usually it is dispositive; it is the single best guide to the meaning of a disputed term.” *Id.* (quoting *Vitronics*, 90 F.3d at 1582). “[T]he specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor’s lexicography governs.” *Phillips*, 415 F.3d at 1316 (citing *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)). “In other cases, the specification may reveal an intentional disclaimer, or disavowal, of claim scope by the inventor.” *Id.* (citing *SciMed Life Sys., Inc., v. Advanced Cardivascular Sys., Inc.*, 242 F.3d 1337, 1343-44 (Fed. Cir. 2001)). However, “although the specification often describes very specific embodiments of the invention,” the Federal Circuit has “repeatedly warned against confining the claims to those embodiments.” *Id.* at 1323 (citing *Nazoni Communications, Inc. v. ARM Holdings, PLC*, 403 F.3d 1364, 1369 (Fed. Cir. 2005) (“claims may embrace ‘different subject matter than is illustrated in the specific embodiments in the specification’”)). Absent one of the accepted and very specific justifications for doing so, a court should refuse to impose a claim term construction narrower than the term’s ordinary meaning. *See Acumed LLC v. Stryker Corp.*, 483 F.3d 800, 805-06 (Fed. Cir. 2007). Directly contrary to Agere’s theory of claim construction, the Federal Circuit in *Phillips* reiterated that it has “expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment.” *Phillips*, 415 F.3d at 1323 (citing *Gemstar-TV Guide Int’l, Inc. v. ITC*, 383 F.3d 1352, 1366 (Fed. Cir. 2004)).

The prosecution history may be considered to determine how the inventor understood the invention or if the inventor somehow limited the invention in the course of prosecution. *Id.* at 1317 (citing *Vitronics*, 90 F.3d at 1582-83).

B. Preamble Is Normally Not A Limitation

The general rule, reaffirmed by the Federal Circuit just a few weeks ago, is that a preamble does not limit a claim. *Symantec*, 2008 U.S. App. LEXIS 7826, at *11-12; *Allen Eng'g*, 299 F.3d at 1346. In order to depart from the general rule, a preamble must be "necessary to give life, meaning and vitality" to the claim, an inquiry to be made on a case-by-case basis. *Allen Eng'g*, 299 F.3d at 1346 (quoting *Kropa v. Robie*, 187 F.2d 150, 152 (C.C.P.A. 1951); *Catalina Mktg.*, 289 F.3d 801, 808 (Fed. Cir. 2002). A preamble is not a limitation if the body of the claim describes a "structurally complete invention." *Catalina Mktg.*, 289 F.3d at 809 (quoting *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997); *Symantec*, 2008 U.S. App. LEXIS 7826, at *11. Moreover, Federal Circuit precedent is consistent and clear that language of "intended use" in a preamble is not a limitation. *Symantec*, 2008 U.S. App. LEXIS 7826, at *11; *Catalina Mktg.*, 289 F.3d at 808; *see also, Roberts v. Ryer*, 91 U.S. 150, 157 (1875) ("The inventor of a machine is entitled to the benefit of all the uses to which it can be put, no matter whether he had conceived the idea of the use or not.").

VI. PROPOSED CONSTRUCTION OF CLAIM TERMS

A. U.S. Patent 5,048,054—the “Line Probing” patent

1. Overview

The '054 patent, entitled “Line Probing Modem,” was invented between the time the V.32 standard was approved in 1984 and the V.34 standard was approved in 1994.²⁰ It addresses the issue of increasing error probability with higher transmission rates.

Transmission of data without errors depends on a variety of factors, including the conditions of the transmission channel. Channel conditions usually vary with time, further complicating the problem. But when channel conditions are unfavorable with respect to one transmission band, the impact of the unfavorable channel conditions may be reduced by using an alternate transmission band.

Prior to the '054 patent, modems were designed with a transmission band having a carrier frequency that was either fixed (as in V.32) or that required manual tuning prior to data transmission. '054 patent, col. 1:49-54. Channel conditions often vary considerably between different lines or connections, and conventional schemes did not adapt by selecting the best transmission band under varying channel conditions. '054 patent, col. 1:54-58.

The invention of the '054 patent uses a line probing signal (that simultaneously stimulates multiple frequency bands) to measure channel characteristics and then dynamically selects one of multiple frequency bands in accordance with the measured characteristic. '054 patent, col. 1:61-2:7. Before data transmission, a modem receives, via a communication channel, a line probing signal sent from a remote modem for the purpose of probing the condition of the

²⁰ Prior to the V.34 standard, modems transmitted data in a fixed radio frequency range (the center of which is the “carrier frequency”), and the width of this range (the “transmission band” or “frequency band”) is directly related to the symbol rate. '054 patent, col. 1:26-28.

channel. The modem estimates the condition of the channel by analyzing the received line probing signal. The estimation can be made by measuring a parameter that characterizes the channel, for example, signal to noise ratio (SNR). The higher the SNR, the better the channel condition; conversely, the lower the SNR, the worse the channel condition.

2. Proposed Constructions

a. “receiver” (claims 1, 12, 46)

GE Licensing’s Proposed Construction	Defendant’s Proposed Construction
Plain meaning.	<i>a hardware device for accepting signals from a remote device</i>

The term “receiver” is used in claims 1, 12 and 46 consistent with its plain meaning. The claimed “receiver” is any structure capable of receiving an electrical signal.²¹ There is no justification or basis for Agere’s attempt to impose a “hardware device” limitation on the “receiver”. That has no support in the specification or prosecution history.

Rather, the specification supports GE Licensing’s proposed construction. There is no specific description of receiver, and specific embodiments are shown where a “receiver” is referred to as both a component of a modem (*e.g.*, receiver 46 or receiver 24) or as the modem itself (the “receiver” shown in Figure 2). *See* ’054 patent, Figs. 1 and 2, col. 4:56-64, col. 10:8-

²¹ “Structure” as used here encompasses a computing device programmed with software to perform a function. Agere apparently would like to go further by requiring structure solely in the form of hardware. Agere would like to (improperly) interpret Figure 1 of the patent as a limiting diagram of a physical device in which the “receiver” is a hardcoded component physically separate from any other hardcoded component, and to read out any general use structure (such as a generic processor or digital signal processor) in which software/firmware controls functionality. However, “In examining the specification for proper context . . . court[s] will not at any time import limitations from the specification into the claims.” *Varco, L.P. v. Pason Sys. USA Corp.*, 436 F.3d 1368, 1373 (Fed. Cir. 2006) (quoting *CollegeNet, Inc. v. ApplyYourself, Inc.*, 418 F.3d 1225, 1231 (Fed. Cir. 2005)); *accord* *Kwitek v. Pilot Corp.*, 516 F. Supp. 2d 709, 719 (E.D. Tex. 2007) (“Claims should be read broadly, and additional limitations should not be imported from the specification, and certainly not from [the] description of the preferred embodiment.”).

52. Further references to “receiver” in the specification (of which there are many) use “receiver” to indicate nothing more than structure which receives an electrical signal. *See, e.g.*, ’054 patent, col. 1:43-48, col. 8:23-30. The phrase “hardware device” is not found with reference to the “receiver” either in the specification or prosecution history of the ’054 patent.

Moreover, despite what Agere would like to suggest, Figure 1 (which shows receiver 46 in local modem 2 and receiver 24 in remote modem 4) itself is not restricted to “hardware”. Rather, it is a block diagram showing the functional operation of one embodiment of the claimed invention.²² Such an argument sharply contravenes Federal Circuit precedent holding that patent drawings are “not meant to represent ‘the’ invention or to limit the scope of coverage defined by the words used in the claims themselves.” *Gart v. Logitech, Inc.*, 254 F.3d 1334, 1342 (Fed. Cir. 2001); *see also, TI Group Auto. Sys., Inc. v. VDO, LLC*, 375 F.3d 1126, 1136 (Fed. Cir. 2004) (stating, “we have held that ‘the mere fact that the patent drawings depict a particular embodiment of the patent does not operate to limit the claims to that specific configuration.’” (quoting *Anchor Wall Sys. v. Rockwood Retaining Walls, Inc.*, 340 F.3d 1298, 1306-07 (Fed Cir 2003))); *MBO Labs., Inc. v. Becton, Dickinson & Co.*, 474 F.3d 1323, 1333 (Fed. Cir. 2007) (“patent coverage is not necessarily limited to inventions that look like the ones in the figures”).

There is also no justification or basis for Agere’s attempt to “load” the simple word “receiver” with other language from the claim. Indeed to do so would only introduce either

²² Likewise, any notion that the receiver 46 and line probing processor 54 must be physically separate “hardware devices” (as opposed to found in a programmable, multifunction general processor or digital signal processor) has no support in the specification, the prosecution history, or the understanding of one of ordinary skill in the art. Though the receiver 46 is depicted as a separate block from the adaptive filter 47 and decoder 48, in the specification, the adaptive filter 47 and decoder 48 are described as being part of the receiver 46. ’054 patent, Fig. 1, col. 4:39-37, col. 4:59-64. Likewise, claims 8, 18 and 63 say that the “receiver further comprises . . .” an “adaptive filter.” ’054 patent, claims 8, 18 and 63.

redundancy or confusion. The words “for accepting signals from a remote device” already appear in Claims 1, 12 and 46 (all of which recite “a receiver for receiving the modulated signal and for receiving a line probing signal sent by the remote device...”). ’054 patent, claims 1, 12 and 46. Agere has merely substituted the word “accepting” for “receiving”. The Federal Circuit has stated that substituting a proposed construction into the claim itself is a simple and effective test to determine whether a claim construction is inappropriate and nonsensical. *Schoenhaus v. Genesco, Inc.*, 440 F.3d 1354, 1357 (Fed. Cir. 2006) (finding that “plaintiffs’ proposed definition will only hold if, substituting either of the two proffered meanings in place of the phrase [to be construed], [the claim] makes sense”); *see also, Power Mosfet Techs., LLC v. Siemens AG*, 378 F.3d 1396, 1410 (Fed. Cir. 2004) (interpretations of claims rendering claim terms superfluous is disfavored). Inserting Agere’s proposed definition, the resulting claim language would read:

hardware device for accepting signals from a remote device for receiving the modulated signal and for receiving a line probing signal sent by the remote device over the channel.

This amply demonstrates the redundancy and confusion that Agere’s proposed construction would produce, and why it should therefore be rejected.

Agere’s construction is also inconsistent with the understanding of one of ordinary skill in the art at the time the application for the ’054 patent was filed. Fundamentally, one of ordinary skill in the art at the time of the invention would have been knowledgeable about the common use of the term “receiver,” since modems that received signals were well known by May 1989. *See* Bims Decl. ¶¶ 28. One of ordinary skill in the art at that time was aware that multifunction general processors and digital signal processors are programmed to perform receiver functions. *See* Bims Decl. ¶¶ 29-31.

In contrast, GE Licensing's proposed construction is logically supported and consistent with knowledge of ordinarily skilled artisans. Therefore, GE Licensing's proposed construction should be adopted by this Court.

b. **“line probing processor” (claims 1, 12, 46)**

GE Licensing's Proposed Construction	Defendant's Proposed Construction
<i>structure that processes a line probing signal</i>	<i>a hardware component that processes a line probing signal</i>

GE Licensing requests that “line probing processor” be construed simply as the words themselves dictate—*structure that processes a line probing signal*.²³ Once again, Agere seeks to impose a hardware limitation without justification. Agere has stated in its noninfringement contentions that through its use of the phrase “hardware device” it will attempt to convince the jury (and this Court) that the “line probing processor” must be some special, separate, physical component (as opposed to a general use processor or digital signal processor). Not so, and that position has no support in the specification or prosecution history.

The specification generically describes a “line probing processor” as structure which is capable of “measuring characteristics of the channel based upon the received line probing signal.” *See* '054 patent, claims 1, 12 and 46; col. 4:67-5:4; col. 5:62-8:38. As already discussed, Figure 1 of the '054 patent is a functional block diagram. The specification states, “The main outputs of the line probing processor are the transmitter and receiver baud rates, Q₁ and Q₂, the transmitter and receiver carrier frequencies, f_{c1} and f_{c2}, the transmitter and receiver bit rates, R₁ and R₂, as well as an error code, which may indicate some unexpected error during the line probing process (such as failure in detecting the line probing signal, failure in

²³ Neither party is seeking construction of the term “line probing signal,” which appears in each of the asserted claims 1, 12 and 46.

synchronization, DPSK transmission error, etc.).” ’054 patent, col. 14:46-54. It is not intended to show, as Agere has contended, that the line probing processors 54, 58 are hardcoded or hardwired or otherwise physically separate devices. And even if they were so described in the specification, “[c]laims should be read broadly, and additional limitations should not be imported from the specification, and certainly not from [the] description of the preferred embodiment.” *Kwitek*, 516 F. Supp. 2d at 719.

Agere’s proposed construction is also inconsistent with the understanding of one of ordinary skill in the art at the time the application for the ’054 patent was filed. *See* Bims Decl. ¶¶ 33-35. One of ordinary skill in the art at the time of the invention would have understood that “line probing processor” refers to any structure that processes a line probing signal. *Id.* Such a “structure” includes a computing device programmed with software to perform a function. *Id.*

Once again, in contrast, GE Licensing’s proposed construction is logically supported and consistent with the knowledge of ordinarily skilled artisans. Therefore, again, GE Licensing’s proposed construction should be adopted by this Court.

c. **“selector” (claims 1, 12, 46)**

GE Licensing’s Proposed Construction	Defendant’s Proposed Construction
Plain meaning.	“Invalid based on indefiniteness (35 U.S.C. § 112, ¶ 1); invalid based on lack of enablement (35 U.S.C. § 112, ¶ 2).”

“Selector” is used in claims 1, 12 and 46 consistent with its plain meaning, i.e., structure that runs a choosing algorithm. Agere offers no contrary construction, opting instead to inappropriately interject at this stage defenses of indefiniteness and lack of enablement.²⁴

²⁴ As shown below in Section VI(A)(2)(d), Agere does provide constructions (albeit improperly restrictive constructions) for the two phrases which follow “selector” in claims 1, 12 and 46.

(continued...)

The '054 patent describes a “selector” in various embodiments as being a structure used “for selecting one of the plurality of frequency bands” (col. 2:2-3), that “selects the identified band as the selected band” (col. 2:52-53), and is used “for selecting one of the plurality of bit rates” (col. 3:51-52). Further, in the context of one of the preferred embodiments, the specification discloses the implementation by the line probing processor of a decision or choosing algorithm to perform the selecting, stating that “Modem 2 then executes a final decision algorithm to select the carrier frequencies baud rates and bit rates to be used for communication over channels A and B (step 220).” '054 patent, col. 14:1-4, col. 14:8-53. A person of ordinary skill would understand that the function of selecting is fundamentally an algorithm that chooses (or a decision algorithm) based on its plain meaning, and that it can be implemented in a general use processor or digital signal processor. *See*, Bims Decl. ¶38.

And in the context of one of the preferred embodiments, the specification discloses the implementation by the line probing processor of a decision algorithm to perform the selecting. '054 patent, col. 14:8-53.

Accordingly, Agere’s position that “selector” has no discernable meaning and is not enabled is utterly without foundation and should be rejected in favor of GE Licensing’s construction. One of ordinary skill in the art at the time the application for the '054 patent was filed would have understood that “selector” refers to any structure that runs a choosing algorithm. *See* Bims Decl. ¶¶ 38-39.

Thus, Agere implicitly acknowledges that what the selector is doing (and how it is being done) is perfectly definite and enabled.

d. **“for selecting one of the plurality of frequency bands” (claims 1, 12)**

GE Licensing’s Proposed Construction	Defendant’s Proposed Construction
Plain meaning.	<i>for determining a frequency band to be used for receiving a modulated signal from the remote device, based upon the channel characteristics measured by the line probing processor</i>

e. **“for selecting one of the plurality of bit rates” (claim 46)**

GE Licensing’s Proposed Construction	Defendant’s Proposed Construction
Plain meaning.	<i>for determining a bit rate to be used for receiving a modulated signal from the remote device, based upon the channel characteristics measured by the line probing processor</i>

The phrases “for selecting one of the plurality of frequency bands” (used in claims 1 and 12) and “for selecting one of the plurality of bit rates” (used in claim 46) are used in the claims consistent with their plain meaning. Neither party has requested construction of the terms “a plurality of frequency bands” and “plurality of bit rates.” Thus, the issue is whether the phrase “for selecting one of” requires construction beyond its plain meaning. It does not. Indeed, there are few phrases so plainly amenable to a “plain meaning” construction.²⁵

Agere, through its convoluted and wordy constructions, is merely attempting to introduce redundancy or confusion and/ or improperly import limitations into the asserted claims. The ’054 patent describes a “selector” in a preferred embodiment as being used “for selecting one of

²⁵ One of ordinary skill in the art at the time of the invention would have understood that the phrases “for selecting one of the plurality of frequency bands” and “for selecting one of the plurality of bit rates” to mean the selection of, respectively, one of the plurality of frequency bands or bit rates. *See* Bims Decl. ¶ 41-42. In practice, this would be accomplished by applying a choosing algorithm in a programmed processor. *See* Bims Decl. ¶ 41.

the plurality of frequency bands" (col. 2:2-3), "selects the identified band as the selected band" (col. 2:52-53), and is used "for selecting one of the plurality of bit rates" (col. 3:51-52). The specification also discloses the implementation by the line probing processor of one embodiment of a decision or choosing algorithm to perform the selecting, stating that "[m]odem 2 then executes a final decision algorithm to select the carrier frequencies baud rates and bit rates to be used for communication over channels A and B (step 220)." '054 patent, col. 14:1-4, 14:8-53. The specification also states that, in one embodiment, "the modem further includes logic for selecting one of the plurality of different bit rates based upon the measured characteristics of the receiver channel." '054 patent, col. 3:6-21; *see also, id.*, col. 3:41-55. The phrase "for selecting one of" has no special connotation other than what the plain English conveys.

Agere has done nothing more than improperly reorder clauses and insert nonsensical additional limitations. *See Schoenhaus*, 440 F.3d at 1357. First, Agere is substituting "determining" for "selecting." Whatever the intended (but unstated) nuance assigned to this swap by Agere, it is unsupported in the claims themselves, the specification and the prosecution history. Likewise unsupported is Agere's attempt to import other parts of the claim into its definition here. The result of Agere's improper actions is shown below (using claim 1 as an example):

Clause proposed by Agere for construction	Agere's proposed construction	How Claim 1 would read with Agere's definition inserted
<i>a selector for selecting one of the plurality of frequency bands, said selection being based upon the measured characteristics of the channel, said selected frequency band to be used for receiving the modulated signal from the remote device</i>	<i>"for determining a frequency band to be used for receiving a modulated signal from the remote device, based upon the channel characteristics measured by the line probing processor."</i>	<i>for determining a frequency band to be used for receiving a modulated signal from the remote device, based upon the channel characteristics measured by the line probing processor, said selection being based upon the measured characteristics of the channel, said selected frequency band to be used for receiving the modulated signal from the remote device</i>

In the end, Agere's construction mostly just moves clauses around as if claim construction were some sort of shell game. And like any good shell game, Agere is attempting to hide what lays beneath the shells, in this case the above bolded limitation “by the line probing processor.” Imposing on the claim a requirement that the selecting be performed “by the line probing processor” (and hiding that it seeks to do so) is Agere's aim—but there is no such requirement in the claim, and even if that is what happens in the preferred embodiment, once again, “Claims should be read broadly, and additional limitations should not be imported from the specification, and certainly not from [the] description of the preferred embodiment.” *Kwitek*, 516 F. Supp. 2d at 719.

Agere's convoluted and flawed constructions are unsupportable and should be rejected.

GE Licensing's proposed construction is both logical and supported, and should be adopted.

B. U.S. Patent 5,428,641—the “Zero Padding” patent

1. Overview

As previously discussed, modems transmit a number of bits per symbol. The examples provided in the modem technology overview previously provided in this brief (as well as the V.32 and V.32bis modem standards) discuss transmitting integral numbers of bits per symbol,

e.g., 2, 3, 4, 5, or 6. *See also*, '641 patent, col. 1:31-39. Sometimes, however, the number of bits per symbol transmitted may change over time, resulting in fractional number of bits per symbol on average (*see supra* note 19). *Id.*, col. 1:40-45. For example, if three-quarters of the time 5 bits per symbol are transmitted and one-quarter of the time 4 bits per symbol are transmitted, then an average of 4.75 bits per symbol are transmitted.

One prior art method of transmitting a fractional number of bits per symbol was “constellation switching,” which the patent describes as switching between sending symbols from two constellations—one with, for example, D bits/symbol and one with D-1 bits/symbol. *Id.*, col. 1:47-53. Two constellations are used, one with 2^D points (= 32, for D = 5), and one with 2^{D-1} points (= 16, for D-1 = 4). Problems with this method included increased complexity and an increase in peak-to-average power ratio. *Id.*, col. 1:54-57; *see also*, Bims Decl. ¶ 48.²⁶

But the invention of the '641 patent transmits a fractional number of bits per frame without the disadvantages of constellation switching. In addition, it employs a constellation mapping scheme to minimize power usage. A first and a second data frame of slightly different sizes (J and J-1 bits, respectively) are selected, and then a zero is added (“zero padding”) to the smaller frame so that the first and second frames become the same size. *Id.*, col. 2:44-50. For example, if the system wants to transmit 16.67 bits, the larger frame would have J = 17 bits and the smaller frame would have J-1 = 16 bits. When the smaller frame of data is transmitted, a zero is added to the smaller frame in the most significant digit position to make 17 bits.

With the two frames now equal-sized, they can be mapped using the same constellation having 2^J points. The zero was padded in the most significant digit position of the smaller frame,

²⁶ One way of addressing this problem was to create frames having a number N of symbols so that an integral number of bits per frame could be transmitted. After the V.34 standard allowed multiple bit and symbol rates, this became an impractical solution.

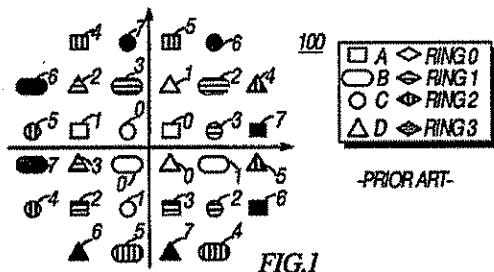
which maps the shorter frame to points in the constellation closest to the center or origin of the constellation, minimizing energy use.

2. Proposed Constructions

a. “constellation” (claims 1, 3, 5, 7)

GE Licensing's Proposed Construction	Defendant's Proposed Construction
<i>a finite set of points in a space</i>	<i>the set of 2^n multi-dimensional signal points used to represent a mapping frame of n input data bits</i>

“Constellation” is a term of art in the modem field. As discussed in the modem technology overview above and in the Background section of the '641 patent, modems transmit a series of symbols at a symbol rate S symbols per second. '641 patent, col. 1:21-23. Each symbol can be represented by a “line signal state” generated by the modem, and each line signal state can be represented by a set of points in a signal constellation. *Id.*, col. 1:25-31. A specific example of a 32-point constellation is shown in Figure 1 of the patent:



In order to generate such an exemplary constellation, the modem must transmit at least 5 bits, which specifies the 32 points ($2^5 = 32$). *See id.*, col. 1:31-39. More generally, a constellation can be a finite set of points occupying an integral number of dimensions. For example, a one-dimensional constellation would be specified along a single line; a two-dimensional constellation can be specified as shown in Figure 1 above; and a three-dimensional constellation would be specified using x, y, and z axes. Higher dimensional (e.g., 4D and 8D) constellations are also used. *See* Bims Decl. ¶¶ 45-46.

In his 2002 book referred to earlier (Tretter, *Constellation Shaping* (Exhibit E)), the definition of ‘constellation’ by Agere’s expert Steven Tretter is like that proposed here by GE Licensing. Dr. Tretter’s book recounts the history of the modem field related to the development of the V.34 recommendation. Tretter, *Constellation Shaping* xi (Exhibit E). He defines a “constellation” as “a finite set of points selected from an N -dimensional space,” where “ N ” can be any positive integer. *Id.* at 25; *see also*, Rajiv Laroia, Nariman Farvardin, and Steven A. Tretter, *On Optimal Shaping of Multidimensional Constellations*, 40 IEEE Trans. On Info. Theory 1044, 1044 (July 1994, submitted 1991-93) (Agere GE 13552) (hereinafter “Laroia, et al., *Optimal Shaping*”) (Exhibit K) (stating, “A constellation C generally consists of a set of points on an N -dimensional lattice (translate) Λ that are enclosed within a finite region R .”).

GE Licensing’s definition removes the “ N -dimensional” language from Dr. Tretter’s definition since that mathematical nuance is unnecessary to resolve any issues in the case, so there is no need to burden the jury with it. What remains is “***a finite set of points in a space***”, which is understandable to a jury and serviceable for this case, as well as consistent with the meaning in the art and with the ’641 patent specification.

b. **“constellation switching” (claims 1, 3, 5, 7)**

GE Licensing’s Proposed Construction	Defendant’s Proposed Construction
<p>The preamble of claims 1, 3, 5, and 7 is not limiting.</p> <p>If the preamble is found to be limiting, “constellation switching” means <i>a change between two constellations having different numbers of points</i></p>	<p>The preamble of claims 1 and 3 is limiting.</p> <p>“constellation switching” means <i>using constellations with varying numbers of points for mapping multiple frames of data bits</i></p>

A preamble is not a limitation if the body of the claim describes a “structurally complete invention” or if the preamble merely states the intended use of the invention. *Symantec*, 2008

U.S. App. LEXIS 7826, at *11; *Catalina Mktg.*, 289 F.3d at 808-09. The preambles of claims 1, 3, 5, and 7 are therefore non-limiting.

The bodies of claims 1, 3, 5, and 7 are structurally complete. Claims 1 and 5 have these steps—selecting a number of bits, inserting a zero, selecting a signal constellation (claim 1) or selecting a set of signal combinations (claim 5), and mapping the frame bits. None of the steps refers back to or relies on the constellation switching of the preamble for completeness. Similarly, apparatus claims 3 and 7 include three claim structures—frame selector, zero insertion unit, and signal constellation selector/mapper. None refers back to or relies on the constellation switching term in the preamble for completeness.

Moreover, the preamble language at issue reflects intended use, *i.e.*, use without constellation switching. Intended use is not limiting. *See, e.g.*, *Catalina Mktg.*, 289 F.3d at 808; *Allen Eng'g*, 299 F.3d at 1346-47 (Fed. Cir. 2002).

If, however, the preamble is determined to be limiting here, “constellation switching” should be construed to mean *a change between two constellations having different numbers of points*. The specification describes one example where the switching occurs between one constellation having 2^D points (where each point represents a symbol of D bits) and one having 2^{D-1} points (where each point represents a symbol of D-1 bits) in order to transmit an average fractional number of bits per symbol between D and D-1. '641 patent, col. 1:47-53. In another example, the switching occurs on a frame basis to transmit a fractional number of bits Q per frame, where Q is between J and J-1. In this example, the switching is between constellations having 2^J and 2^{J-1} points. *Id.*, col. 2:16-19; 4:19-24. Both cases include switching between constellations with different numbers of points. *See* Bims Decl. ¶ 48. Thus, a construction of “constellation

switching,” as found in the preambles of all the asserted claims and which is faithful to the specification is “*a change between two constellations having different numbers of points.*”

c. “can be” (claims 1, 3)

GE Licensing’s Proposed Construction	Defendant’s Proposed Construction
The preamble of claims 1 and 3 is not limiting. If the preamble is found to be limiting, “can be” should be given its plain meaning – that is, it cannot be broken down any more.	The preamble of claims 1 and 3 is limiting. “can be” means <i>are</i> or <i>must be</i> . As used in the preamble, this term creates a required or limiting condition for the claim. Thus, the phrase “can be transmitted without constellation switching” must be read as “are transmitted without constellation switching.”

The very nature of the term “can be” is permissive, not mandatory. That is the way it is used in the patent. *See, e.g.*, ’641 patent, col. 7:65-68 (“The frame-mapping device maps N-symbol frames of data, N a predetermined integer, such that a fractional number of bits per frame can be transmitted without constellation switching”); *id.*, col. 4:24-26 (“Using the scheme of the present invention, such a constellation switching can be avoided.”). Agere’s contention that “can be” means the opposite of permissive (*are* or *must be*) stands the phrase on its head and should be rejected.

In addition, a variant of the doctrine of claim differentiation supports the position of GE Licensing and contradicts Agere’s position. Claims 1 and 3 contain the phrase “a fractional number of bits per frame can be transmitted without constellation switching,” whereas claims 5 and 7 contain the phrase “a fractional number Q of bits are mappable per frame without constellation switching.” The use of “are” and “can be” in other claims suggests that contrary to what Agere says, “can be” should not be construed as “are”.

d. **“frame selector” (claims 3, 7)²⁷**

GE Licensing’s Proposed Construction	Defendant’s Proposed Construction
<i>structure that can select the length of data in a frame</i>	<i>a hardware device for selecting a number of data bits to fill a frame</i> “Frame selector” does not include devices storing or executing software such as a central processing unit (CPU) or a digital signal processor (DSP).

GE Licensing’s proposed definition for “frame selector”—“structure that can select the length of data in a frame”—follows directly from the claim and specification language. In contrast, Agere’s construction is tortured and specifically includes negative strictures (exclusions) that are unwarranted. Agere here (and for the next two claim elements), provides a one-sentence construction, but then adds an explanatory sentence excluding certain types of devices. In that way, Agere seeks to limit the claims to pure hardware implementations. For reasons already discussed above, there is no justification or basis for doing so.

GE Licensing uses the word “structure” in its construction. The only substantive distinction between the parties’ constructions is Agere’s improper addition of the word “hardware” to modify “device.” Without the word “hardware,” the parties are close to agreement. However, as already mentioned, as the appropriate construction should encompass a computing device programmed with software to perform a function. Most assuredly, if the “hardware” adjective is incorporated in the construction, Agere will take the position that the claim can be satisfied by hardware and only hardware, not, for example, by a computing device

²⁷ Claims 1 and 5 are method claims having a step for selecting the number of bits to fill each frame. Claims 3 and 7 are apparatus claims that include as an element a “frame selector” that performs a similar function. As limited by the other words in claims 3 and 7, the inventive frame-mapping device includes a frame selector, operably coupled to receive input data, for selecting either J or J-1 bits for each frame of data. The specification describes the frame selector similarly. See ’641 patent, col. 8:2-7.

programmed with software. However, even if the preferred embodiment consisted of “pure” hardware, that would be no basis for restricting the claim. “Claims should be read broadly, and additional limitations should not be imported from the specification, and certainly not from [the] description of the preferred embodiment.” *Kwitek*, 516 F. Supp. 2d at 719.

Anyone of ordinary skill in the art in 1993 knew that modems could be implemented in hardware, software, or, more likely, as some combination of the two. *See Bims Decl.* ¶ 53. Nothing in the claims, specification, or file history contradicts that well-known notion. In fact, the file history contradicts Agere’s argument. During prosecution, the Examiner objected to the ’641 specification because two equations (found at col. 6, lines 1 and 27) were unclear, since each equation had a same symbol on both sides of the equals sign, with additional terms on one side only. ’641 patent file history, *Supplementary Amendment and Response Under 37 C.F.R. 1.115*, Feb. 1, 1995 (GE 000494-502) (Exhibit L). In a Supplemental Amendment, the applicant explained that such notation was “terminology specific to computer software technology.” *Id.* The Examiner immediately allowed the application to issue. ’641 patent file history, *Notice of Allowability*, Feb. 3, 1995 (GE 000513) (Exhibit M).

Accordingly, GE Licensing’s construction of “frame selector” as “***structure that can select the length of data in a frame***” is the proper one. Agere’s unjustified and more restrictive construction should be rejected.

e. "zero insertion unit" (claims 3, 7)²⁸

GE Licensing's Proposed Construction	Defendant's Proposed Construction
<i>structure that can insert a zero when required</i>	<i>a hardware device for adding a zero to a frame of data bits</i> "Zero insertion unit" does not include devices storing or executing software such as a central processing unit (CPU) or a digital signal processor (DSP).

GE Licensing's proposed definition for "zero insertion unit"—"structure that can insert a zero when required"—follows directly from the claim and specification language. In contrast, Agere's construction, like its "frame selector" construction, is tortured and specifically includes negative strictures (exclusions) that are unwarranted.

Here again, the substantive distinction in the proposed constructions lies in Agere's improper addition of the word "hardware" to modify "device." Without the word "hardware," the parties are again close to agreement.

For the reasons discussed in connection with "frame selector," GE Licensing's construction, which is consistent with the intrinsic and extrinsic evidence, should be adopted. The "zero insertion unit" is "***structure that can insert a zero when required***". Agere's attempt to exclude use of software and firmware when implementing zero insertion should be rejected as contrary to law and fact.

²⁸ Method claims 1 and 5 include the step of inserting a zero in certain data frames. The inventive frame-mapping device of claims 3 and 7 includes a "zero insertion unit" that performs a similar function, operably coupled to the frame selector, for inserting a zero in some of the data frames. The specification describes the zero insertion unit similarly. *See '641 patent, col. 8:7-10*

f. "signal constellation selector/mapper" (claims 3, 7)²⁹

GE Licensing's Proposed Construction	Defendant's Proposed Construction
<i>structure that can select a signal constellation and can map frame bits onto constellation points</i>	<i>a hardware device for selecting a constellation and mapping frames of data bits to signal points or symbols in such constellation</i> "Signal constellation selector/mapper" does not include devices storing or executing software such as a central processing unit (CPU) or a digital signal processor (DSP).

GE Licensing's proposed definition for "signal constellation selector/mapper"—"structure that can select a signal constellation and can map frame bits onto constellation points"—follows directly from the claim and specification language. In contrast, Agere's construction, like its "frame selector" and "zero insertion unit" constructions, is tortured and specifically includes negative strictures (exclusions) that are unwarranted.

Again, the main substantive difference is Agere's improper addition of the word "hardware" to modify "device." For reasons that need not be repeated, GE Licensing's construction of "signal constellation selector/mapper" as "*structure that can select a signal constellation and can map frame bits onto constellation points*" is the proper one. Neither the law nor the facts support excluding the use of software and firmware when implementing "signal constellation selector/mapper".

²⁹ Method claims 1 and 5 include two steps for selecting a signal constellation and mapping frame bits onto constellation points. Apparatus claims 3 and 7 include as an element a "signal constellation selector/mapper" that performs similar functions. As used in claims 3 and 7, the inventive frame-mapping device includes a signal constellation selector/mapper, operably coupled to the zero insertion unit, for selecting a signal constellation and mapping frame bits onto constellation points. The specification describes the signal constellation selector/mapper similarly. See '641 patent, col. 8:10-17.

g. **“operably coupled” (claims 3, 7)**

GE Licensing’s Proposed Construction	Defendant’s Proposed Construction
<i>whose input is derived from the output of another stage or structure</i>	<i>physically connected to allow inter-operation</i>

Apparatus claims 3 and 7 recite the term “operably coupled” in several places in connection with how the different elements of the claims operate with each other. The specification similarly uses the term “operably coupled” when describing specific embodiments. ’641 patent, col. 8:3-12. As already discussed, nothing limits the apparatus to a purely hardware device. Likewise, there is no requirement for physical connections to allow inter-operation, which is precisely the requirement that Agere seeks to impose. *See* Bims Decl. ¶ 55.

By now it should be clear that those skilled in the art were aware that modems have been implemented in hardware, software, and combinations of the two from before 1993 until today. *See* Bims Decl. ¶ 53. Nothing in the claims, specification, or file history contradicts that well-known notion. The attempt to restrict “operably connected” to physical connections is just another part of Agere’s inappropriate attempt to exclude software and firmware from the ambit of the inventions.

Given the choice between GE Licensing’s construction, which is consistent with the intrinsic and extrinsic evidence, and Agere’s legally and factually flawed construction, GE Licensing’s construction of “operably coupled” as “*whose input is derived from the output of another stage or structure*” is the proper one.

C. U.S. Patent 6,198,776—the “PCM Upstream” patent

1. Overview

The V.34 Recommendation adopted in 1994 covers transmission between analog modems on both sides of a communication channel, and communication in both channel

directions was limited to 28,800 bits/sec (increased to 33,600 bits/sec in 1998). ITU-T Recommendation V.34 at 1 (Exhibit F); '776 patent, col. 1:17-18. However, much communication occurred with a service provider, such as AOL or Earthlink, whose networks are digital. '776 patent, col. 1:19-25.

Although communication between a user's telephone and the telephone company (often called the "central office" or "CO") is analog, the signal is digitized at the central office and then transmitted to the recipient's local company (or service provider) digitally using "pulse code modulation" or PCM. *Id.*; Tretter, *Constellation Shaping* at 152 (Exhibit E). It was inefficient to convert the digital data back to analog for transmission downstream³⁰ to the end user's modem. The V.90 recommendation was developed to allow downstream transmission r toward the end user's modem using PCM transmission, *see* '776 patent, col. 1:25-27; Tretter, *Constellation Shaping* at xi, 152 (Exhibit E), which increased downstream transmission to up to 56,000 bits/second.

But the upstream transmission, from the end user toward the service provider, continued to use V.34 modulation at a maximum rate of 33,600 bits/second. '776 patent, col. 1:28-30; Telecommunications Standardization Sector of ITU, *A digital modem and analogue modem pair for use on the Public Switched Telephone Network (PSTN) at data signalling rates of up to 56 000 bit/s downstream and up to 33 600 bit/s upstream: ITU-T Recommendation V.90* (approved in 1998) (hereinafter "ITU-T Recommendation V.90") (Exhibit N). The V.92 recommendation

³⁰ PCM transmission from the service provider's digital modem to the end user's analog modem is called "downstream PCM" or "PCM downstream" transmission. '776 patent, col. 1:32-35; Tretter, *Constellation Shaping* at 155 (Exhibit E) (describing the "V.90 PCM downstream scheme").

improved upon the V.90 recommendation, increasing upstream transmission³¹ to a maximum of 48,000 bits/second. ITU-T Recommendation V.92 at i (Exhibit G). This advance was made possible by allowing the analog PCM modem (the user's modem connected to the analog telephone line) to vary its transmission signal in such a way as to compensate for the analog-to-digital conversion that takes place in the central office. Varying the transmission signal to compensate for later distortions during transmission is called "precoding."

The '776 patent precodes the data so as to maximize the likelihood of recovering the original data. The '776 patent's precoding scheme utilizes constellations having points properly grouped into equivalence classes,³² selects a constellation point in each equivalence class to represent the transmitted data bits, and transmits an analog level to produce the selected constellation point at the device in the central office that converts the analog level to digital data.

2. Proposed Constructions

a. "quantization device" (claims 1, 9, 30)

GE Licensing's Proposed Construction	Defendant's Proposed Construction
<i>a device that quantizes a signal</i>	<i>a device that converts a signal with a continuum of amplitudes to a set of discrete values, including linear, A-law, μ-law or any other analog to digital conversion</i>

"Quantization device" appears in all the asserted claims in numerous places. It is described in the specification in connection with μ -law or A-law "quantizer 130 in central office

³¹ Since the transmission from the service provider's modem to the end user's modem was called "downstream PCM" or "PCM downstream," the transmission in the opposite direction was naturally called "upstream PCM" or "PCM upstream." The transmitted upstream signal is made up of analog levels corresponding to data to be transmitted. '776 patent, col. 1:42-44.

³² In mathematics, an "equivalence class" is a set of numbers or points having a common characteristic or that naturally group together, e.g., the class of all even numbers. In modems, points included in an equivalence class may be selected according to certain criteria, e.g., to minimize the power or achieve a specific spectral shape.

(CO) 114.” ’776 patent, col. 7:58-59; Fig. 9; *see also*, col. 13:15-18 (quantizer 210 in central office (CO) 186); Fig. 16. In the preferred embodiment, quantizer 130 quantizes the incoming analog signal into octets or eight-bit digital words. *Id.*, col. 1:32-34; 7:63-65. A quantization device is also described in the patent as a “codec in the end user’s central office.” *Id.*, col. 1:46-48. (“Codec” stands for “coder/decoder.”) The patent describes the analog levels transmitted by the end user (or analog) PCM modem as accurately producing predetermined analog levels at the input to the codec in the end user’s central office. GE Licensing’s construction of “quantization device” as “*a device that quantizes a signal*” is consistent with these descriptions in the specification.

Quantization is a term well known to those skilled in the art as is the term quantizer. In quantization, a sampled continuous signal or a large set of discrete signals is approximated by a small set of discrete symbols or integer values. *See* Bims Decl. ¶ 57. There is not reason to depart from that common understanding by limiting the construction, as Agere seeks to do, to converting a “*continuum of amplitudes*” or to further limit the construction to “*analog to digital conversion*”. *See id.*

GE Licensing’s proposed construction should be adopted instead. It is based on what one skilled in the art would take the term “quantization device” to mean.

b. **“Analog pulse code modulation (PCM) modem” (claim 30)**

GE Licensing’s Proposed Construction	Defendant’s Proposed Construction
The preamble of claim 30 is not limiting. If the preamble is found to be limiting, “Analog pulse code modulation (PCM) modem” means <i>a client-side or end user modem connected to an analog phone line</i>	The preamble of claim 30 is limiting. “Analog pulse code modulation (PCM) modem” means <i>a modem that transmits pulse code modulated data over an analog line</i>

c. "upstream PCM data transmission" (claim 30)

GE Licensing's Proposed Construction	Defendant's Proposed Construction
The preamble of claim 30 is not limiting. If the preamble is found to be limiting, "upstream PCM data transmission" means <i>transmission of analog levels in the direction from an analog PCM modem toward a central office.</i>	The preamble of claim 30 is limiting. "upstream PCM data transmission" means <i>transmission of pulse code modulated data to a digital modem</i>

"Analog pulse code modulation (PCM) modem" and "upstream PCM data transmission" both appear in the preamble of claim 30 of the '776 patent. As previously stated, in general preambles do not limit the claim, especially when the preamble merely cites intended use of the invention. *Symantec Corp.*, 2008 U.S. App. LEXIS 7826, at *11-12; *Catalina Mktg.*, 289 F.3d at 808 (Fed. Cir. 2002).

Here, "In an Analog [PCM] modem," manifests the way to use the invention. There is no absolute requirement that the invention be used in such a way, and therefore it is not a limitation. Similarly, "upstream PCM data transmission" merely states what the analog PCM modem is "adapted" for. The word "adapted" is the quintessential word to show an intended use, but not a required use. *See, e.g., Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 868 (Fed. Cir. 1985) (interpreting "adapted to remain . . . metal surfaces" as language of intended use, not a claim limitation), *overruled on other grounds by Nobelpharma Ab v. Implant Innovations, Inc.*, 141 F.3d 1059, 1068 (Fed. Cir. 1998); *Fitness Quest, Inc. v. Monti*, No. 5:06cv02691, 2007 U.S. Dist. LEXIS 60195, at *28 (N.D. Ohio Aug. 16, 2007) (finding non-limiting a preamble that states, "A multipurpose exercise apparatus *adapted* for providing . . .") (emphasis added). Thus, neither "Analog pulse code modulation (PCM) modem" nor "upstream PCM data transmission" is a limitation of claim 30.

If, however, it is determined that the preamble of claim 30 is limiting, then the constructions of “Analog pulse code modulation (PCM) modem” and “upstream PCM data transmission,” which are simple, related terms of art in the modem field, should be what GE Licensing proposes, which follows from how the modem field evolved. As used in the patent as well as in the literature at the time the patent was filed, “analog PCM modem” was just a shorthand for the end user’s or client-side modem that was connected to the analog phone line, as distinguished from the digital PCM modem located on the network side of the phone company’s central office. The Background section of the patent discusses “PCM modems” in general as those modems used to transmit PCM data, where “[f]irst generation PCM modems” transmitted data in PCM mode downstream, and transmit upstream “in analog mode, e.g., V.34 mode.” ’776 patent, col. 1:20-30. In PCM downstream transmission, the “central site PCM modem” (for example, the ISP’s modem) transmits data to the “end user’s PCM modem,” which receives analog levels. *Id.*, col. 1:32-40. “PCM upstream” transmission goes the other way, with the end user (or client-side) PCM modem “transmit[ting] analog levels over the analog loop corresponding to data to be transmitted.” *Id.*, col. 1:42-44. The end user PCM modem transmits “analog levels” upstream toward the central office, and the “analog levels (constellation points) correspond to the data to be transmitted by the end user PCM modem.” *Id.*, col. 2:1-6. In each of these cases, the patent calls both the client-side or end-user modem and the central site modem “PCM modems”—the end user modem being called an “analog PCM modem” because it is connected to the analog phone line (and transmits in analog mode), and the central site modem being called the “digital PCM modem” because it is connected to the digital network line. *See also*, Bims Decl. ¶ 60; ’776 patent, Figs. 8-11 (showing the “analog PCM modem” on the end user side connected to the analog line and the “digital PCM modem” (“PCM DM”) on the central

site side connected to the digital network). Upstream and downstream PCM transmission merely indicates the transmission direction between the analog PCM modem and the digital modem. *See Bims Decl. ¶ 62.*

The patent's use of "analog PCM modem" and "digital PCM modem" to distinguish the two modems and its use of "upstream PCM" and "downstream PCM" comports with the terminology used in the modem field at the time. In the late 1990s, a group called the "Ad hoc group on PCM modems" was convened to develop standards for PCM downstream and PCM upstream transmission. Nuri Dagdeviren, "Proposed Baseline for PCM Upstream," (Dec. 4-5, 1996) (GE 000938-949) (Exhibit O). In a contribution submitted by Nuri Dagdeviren (who later worked at Agere), he states that the ad hoc group was working on "upstream data transmission in PCM modems" and "High speed operation in the upstream direction". *Id.* at GE 000939. This group used the terminology "analog PCM modem," "analog modem," "digital PCM modem," and "digital modem" to describe the modems in PCM systems. *Id.*; *see also* Bahman Barazesh, "TR30.1 PCM Modem ad hoc meeting report, Irvine, California, Nov. 13-15, 1996" (Nov. 25, 1996) (ASI035010-15), ASI035012 (Exhibit P) (in an internal Lucent Technologies memorandum, Bahman Barazesh (also later employed by Agere) notes that the ad hoc committee proposed the term "digital PCM modem" to denote the central site PCM modem and the term "analog PCM modem" to denote the "loop side, or client pcm modem"). These documents use the terms "analog PCM modem" and "digital PCM modem" consistent with the way the '776 patent uses those terms.

Thus, if the preamble of claim 30 is deemed to be limiting, "Analog pulse code modulation (PCM) modem" should be construed as described in the '776 patent and was understood by the industry at the time as "*a client-side or end-user modem connected to an*

analog phone line." Similarly, as described in the '776 patent and understood by the industry at the time, "upstream PCM data transmission" should be construed to mean "*transmission of analog levels in the direction from an analog PCM modem toward a central office.*"

VII. CONCLUSION

For the above reasons, GE Licensing respectfully requests that this Court adopt the constructions proffered by GE Licensing in their entirety.

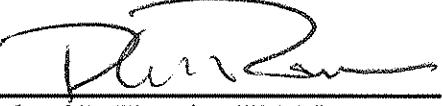
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**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

CERTIFICATE OF SERVICE

I, Philip A. Rovner, hereby certify that on April 28, 2008, the within document was filed with the Clerk of the Court using CM/ECF; that the document was served on the following party as indicated; and that the document is available for viewing and downloading from CM/ECF.

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